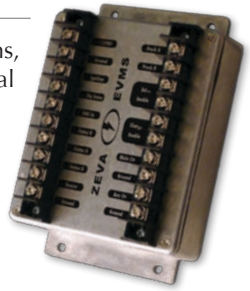
ZEVA

Electric Vehicle Management System v1.1: User Manual

1. Introduction



Developed to address the need to build safer, neater EV conversions, the ZEVA Electric Vehicle Management System combines several common functions required by EVs into one device:

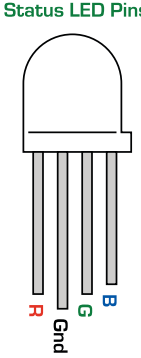
- Battery Management System (BMS) Master Unit: Monitors your BMS cell modules and takes action to protect your battery pack.
- Staged Precharging: Most motor controllers require a precharge (soft-start) system to slowly charge up their internal capacitors before they are enabled.
- Contactor control: Many EVs run multiple contactors for redundant safety. This device manages auxillary contactors, which must be engaged when either driving or charging.
- Charge/drive interlock: Ensures that the vehicle cannot be driven while plugged in.
- Status light and buzzer: A multicolour LED indicates the vehicle status, and a buzzer gives audible warning of any errors detected.

2. Installation

The EVMS should be mounted securely to the vehicle using screws through the four 5mm holes on the case flanges.

There are 20 I/O terminals to connect for full functionality. A recommended wiring diagram is overleaf. The use of forked crimp terminals is recommended for the most reliable connections to the EVMSs. Wire gauge used for most connections should be around 18-20 AWG, to ensure reasonable mechanical strength. Small multicore cable is acceptable for the LED and buzzer wiring harness.

3. Status LED and Buzzer

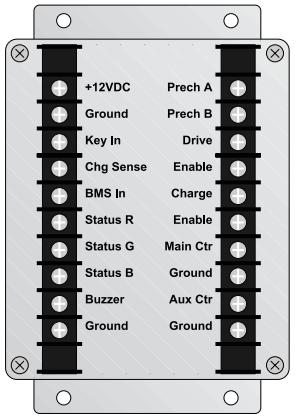


The status LED may display the following codes:

- Blue, blinking: Vehicle idle (sleep)
- Blue: Charging enabled
- Green, flashing: Precharging
- Green: Drive enabled
- Red: BMS error
- Red, flashing: Precharge error
- Green/red flashing: BMS shut down drive
- Blue/red flashing: BMS shut down charger

The buzzer will sound continuously on BMS error, or intermittently on precharge error.

5. Description of I/O Terminals:

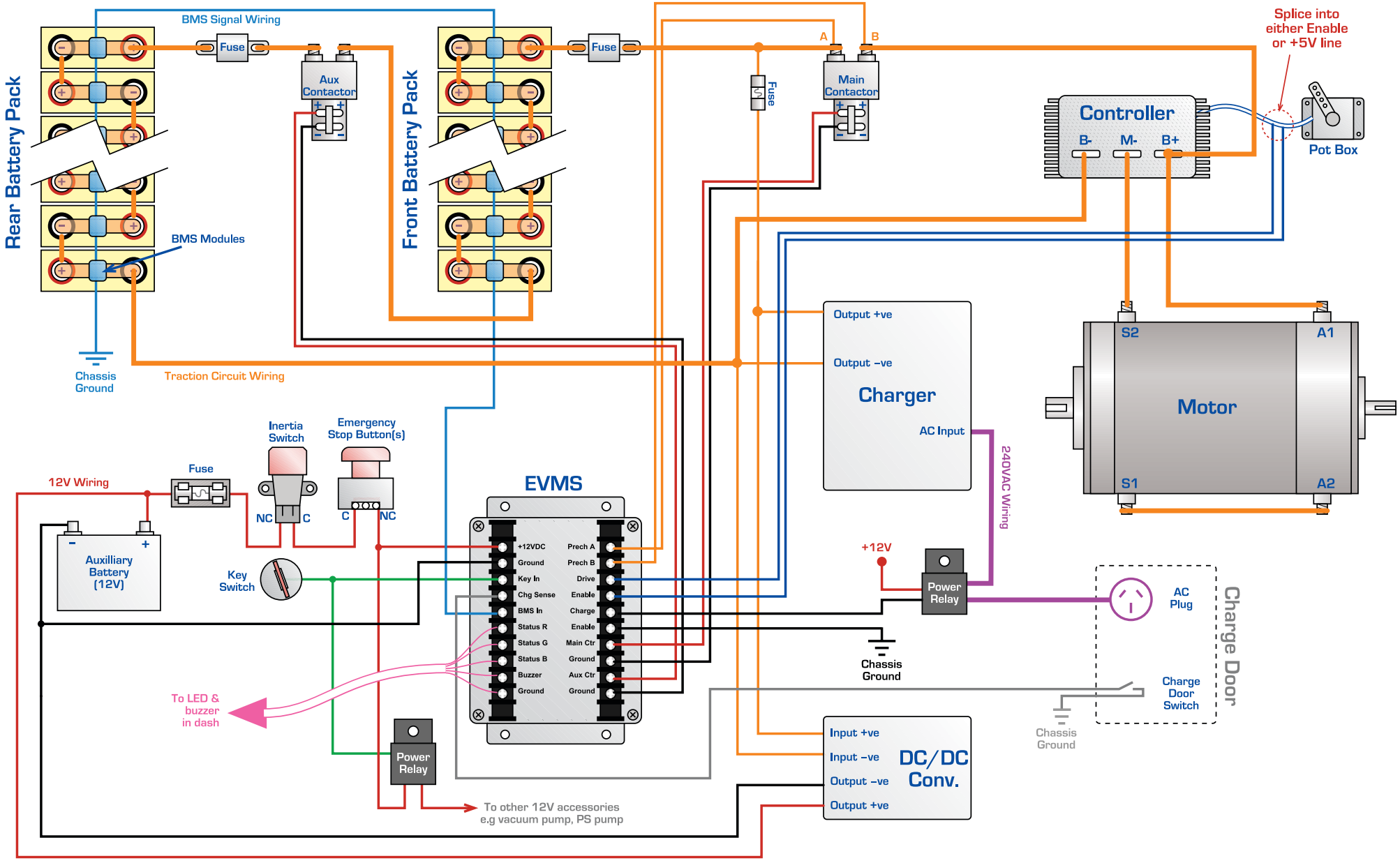


- **+12V:** A permanent +12V supply (9-16V range), in series with any emergency stop switches to ensure everything downstream from the EVMS (charge and drive systems) switch off immediately in an emergency.
- **Ground:** Connect this to chassis ground in your vehicle (not traction circuit negative)
- **Key In:** Should see +12V when they key is turned on, ground or floating otherwise.
- **Chg Sense:** This terminal should be pulled to ground whenever you wish to charge. Typically achieved with either a normally-open switch on your charge door, or an AC relay that closes when the charge cable is plugged in.
- **BMS In:** This terminal should be pulled to ground whenever there is no error reported from the BMS modules. If using a one-wire BMS system, connect one end of your cell module daisy chain to ground and the other end to this terminal.
- **Status RGB:** Outputs for Red, Green and Blue pins on the multicolour status LED (should be installed in the vehicle cabin).
- **Buzzer:** Connect this to the positive terminal on the included piezo buzzer (should be installed in the vehicle cabin).
- **Ground:** May be used as the ground connection for both the status LED and buzzer.
- **Prech A & B:** Connect these to either side of your main contactor. These The polarity is important: A should be on the battery side, B should be on the controller side.
- **Drive Enable:** Connections to the drive enable relay, which will close when the vehicle is allowed to drive. Best used to switch in either the controller enable or throttle signal to controller.
- **Charge Enable:** Connections to the charge enable relay, which will close when the vehicle may be charged. These internal relays rated to 10A current at either 250VAC or 28VDC. They are not suitable for switching typical traction pack DC voltages, or high charge currents. Unless using a low current charger, in most cases you will need to use the internal relay to switch an external power relay to control AC power to the charger.
- **Main Ctr:** This terminal goes to the positive connection on your main contactor.
- **Ground:** May be used for the negative connection on your main contactor.
- **Aux Ctr:** This terminal goes to the positive connection on your auxillary contactor(s).
- **Ground:** May be used for the negative connection on your auxillary contactor(s).

6. Brief Specifications

- Power supply: 9-16VDC (~20mA idle, 5A max)
- Suitable for traction packs: 12-160VDC
- Dimensions: 150x100x50mm
- Casing: Fully enclosed die cast aluminium, weatherproof to IP65
- Internally fused, reverse voltage and over-voltage protected

The ZEVA EV Management System is proudly designed and manufactured in Australia.


Rear Battery Pack
Front Battery Pack
BMS Signal Wiring
BMS Modules
Fuse
Aux Contactor
Main Contactor
A
B
Chassis Ground
Traction Circuit Wiring
Splice into either Enable or +5V line
Controller
B-
M-
B+
Pot Box
Output +ve
Output –ve
Charger
AC Input
240VAC Wiring
Motor
S2
A1
S1
A2
12V Wiring
Inertia Switch
Emergency Stop Button(s)
NC
C
Auxilliary Battery (12V)
Key Switch
EVMS
+12VDC
Ground
Key In
Chg Sense
BMS In
Status R
Status G
Status B
Buzzer
Prech A
Prech B
Drive
Enable
Charge
Main Ctr
Aux Ctr
+12V
Power Relay
AC Plug
Charge Door
Charge Door Switch
To LED & buzzer in dash
Input +ve
Input –ve
Output –ve
Output +ve
DC/DC Conv.
To other 12V accessories e.g vacuum pump, PS pump